

The Effects of Ethanol Extracts of *Jatropha curcas* on Some Hematological Parameters of Chloroform Intoxicated Rats

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Abstract: This study evaluated the effects of the ethanol extracts of *Jatropha curcas* on some hematological parameters of chloroform intoxicated rats. The parameters include white blood cell count, red blood cell count, packed cell volume and hemoglobin concentration. A total of twenty five rats were used for this study and were divided into five groups of five rats each. Group one served as the negative control and was not intoxicated with chloroform. The second and third groups were intoxicated and administered with the ethanol extract of *Jatropha curcas* 100mg/kg body weight and 200mg/kg body weight respectively. The fourth group served as the positive control and was also intoxicated with chloroform but treated with 0.5ml of normal saline. The fifth group was the standard control and was also intoxicated but treated with 5mg/kg body weight of the standard drug Chemiron. The Acute toxicity level of the extract was also determined to be non-lethal at 1900mg/kg body weight. Hematological parameters of HB, WBC and PCV were elevated by ethanol extract of *Jatropha curcas* at 300mg/kg body weight. But the extract had no effect on the RBC concentration.

Key words: *Jatropha curcas* • PCV • Haemoglobin • WBC and RBC

INTRODUCTION

Plant derived products have been used for medicinal purposes for centuries. At present, it is estimated that about 80% of the world population relies on botanical preparations as medicines to meet their health needs [1-6]. Herbs and spices are generally considered safe and proven to be effective against certain ailments. Medicinal plants have certain values that produce physiological and chemical results and the most important of these chemical bioactive compounds is Hydrogen Cyanide (HCN) and this is active in the leaves of *Jatropha curcas* [6]. This plant is used in the treatment of certain ailments by traditional practitioners in some parts of Nigeria [5]. Anemia is a medical condition characterized by lowered haemoglobin level. There are over 400 types of anemia, with hemolytic anemia being the most frequent [7-8]. Assessment of hematological parameters can be used to explain blood relating functions of a plant extract or its products [8-13]. Analysis of blood parameters is relevant in risk evaluation as changes in the hematological

system have higher predictive value for human toxicity when the data are translated from animal studies [11]. *Jatropha curcas* is a plant belonging to the family of euphorbiaceae, it is a shrub that grows 4.5-8m high, the claims by herbalist that the leaves extract of *Jatropha curcas* possess anti-anemic property appears speculative and has not been documented in the literature. The aim of this research was to determine the effects of ethanol extracts of *Jatropha curcas* on some hematological parameters of chloroform intoxicated rats.

MATERIALS AND METHODS

Materials

Plant Materials: The leaves of *Jatropha curcas* were purchased from Oba market in Anambra State and identified by Mr. A. Ozioko of the Department of Plant Science and Biotechnology, University of Nigeria Nsukka. A voucher specimen was deposited in the Department's Herbarium.

Animals: Wistar albino female rats (134 -206g) bred in the Faculty of Veterinary Medicine, University of Nigeria Nsukka, were used in the experiment. The animals were kept under Room temperature and were acclimatized in the new environment for a period of 7 days with free access to food and water before the commencement of the experiment.

Methods

Preparation of Plant Material: The leaves of *Jatropha curcas* were collected, dried and milled to powder using the grinding machine.

Extraction of Plant Material: A known quantity, 500g of ground leaves of *Jatropha curcas* were macerated in 1500ml of ethanol with thorough shaking at regular interval for 72h at room temperature (26-28°C). The resulting solution was filtered using Whatman No. 1 filter paper. The filtrates were concentrated using rotary evaporator to obtain slurry of the extract. The semi-pastry extract was stored in the refrigerator and used for the study.

Experimental Design: Twenty five (25) Wistar albino rats were used in this study. They were randomly distributed into five (5) groups of 4 rats each. Oxidative stress was induced in the rats and this was performed by intraperitoneal injection of chloroform (100 mg/kg b/w). The rats were fed graded doses of ethanol extract of *Jatropha curcas* through oral intubation method. The groups and doses administered are summarized below.

Group 1: (Negative control rats without Chloroform intoxication): rats were treated with [0.5 ml of normal saline).

Group 2: (Chloroform intoxicated rats): rats were treated with (100 mg/kg b.w. of ethanol extract of *Jatropha curcas*).

Group 3: (Chloroform intoxicated rats): rats were treated with (200 mg/kg b.w. of ethanol extract of *Jatropha curcas*).

Group 4: (Positive control rats with Chloroform intoxication) were treated with (0.5 ml of normal saline).

Group 5: (Standard control rats with Chloroform intoxication) were treated with (5 mg/kg body weight of standard drug Chemiron).

Collection of Blood Samples: Blood sample of the rats were collected through ocular puncture for hematological analysis.

Determination of Total Red Blood Cell Count: The determination of total red blood cell count was carried out according to the method of Dacie and Lewis (2000).

Determination of Total White Blood Cell Count: The determination of total white blood cell count was carried out according to the method of Dacie and Lewis (2000).

Determination of Packed Cell Volume (PCV): Packed cell volume (PCV) was determined by the method of Dacie and Lewis (2000).

Determination of Haemoglobin (Hb) Concentration: Haemoglobin (Hb) concentration was determined using haemoglobincyanide (HICN) technique as outlined in the method of Dacie and Lewis (2000).

Statistical Analysis: The data obtained from the laboratory tests were subjected to one- way analysis of variance (ANOVA). Significant differences were obtained at $p \leq 0.05$. The results were expressed as mean and standard deviation (SD). This analysis was estimated using computer software known as Statistical Package for Social Sciences (SPSS), version 18.

RESULTS AND DISCUSSION

Blood examination is a good way of assessing the health status of animals as it plays a vital role in physiological, nutritional and pathological status of organisms [1-7]. Assessment of hematological parameters can be used to determine the extent of deleterious effect on blood constituents of an animal [8] and [11]. It can also be used to explain blood relating functions of chemical compounds/plant extract [13]. Figure 1 showed that group 5 (standard control) rats treated with standard drug chemiron increased significantly ($p < 0.05$) in hemoglobin concentration when compared with group 1 (negative control) and other groups. Groups 2 and 4 rats decreased significantly ($p < 0.05$) in hemoglobin concentration when compared with group 1 (negative control) and group 5 (standard control) rats revealing anemia due to chloroform oxidative stress in the rats. But group 3 rats treated with

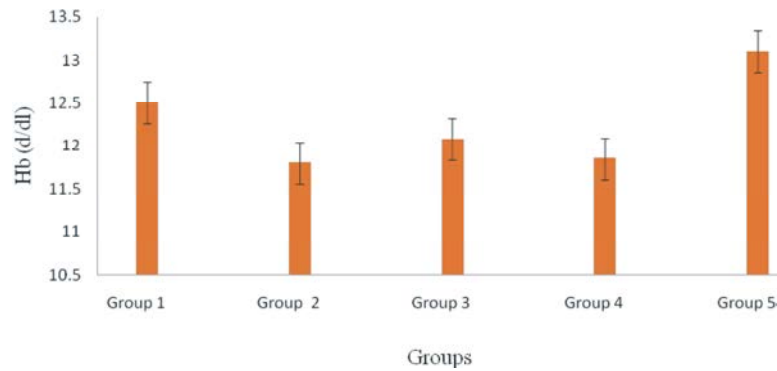


Fig 1: The Effect of *Jatropha curcas* on HB (g/dl) level of Chloroform intoxicated rats

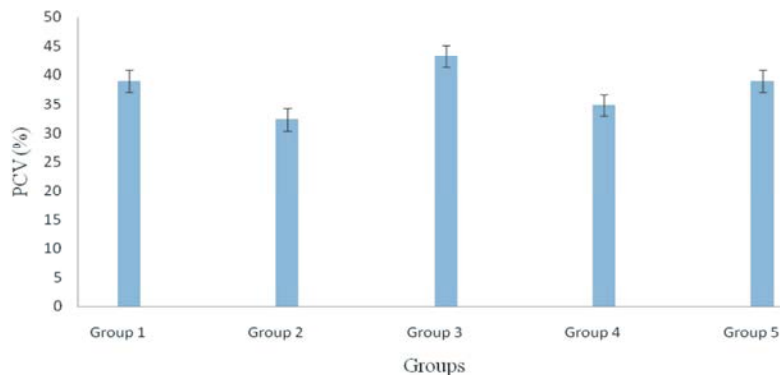


Fig 2: The Effect of *Jatropha curcas* on PCV (%) level of Chloroform intoxicated rats

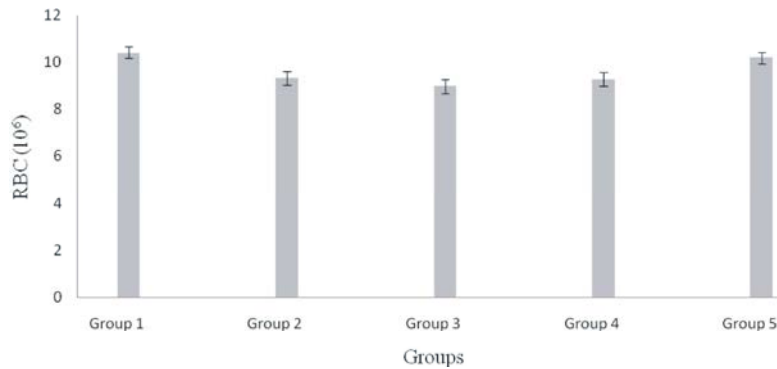


Fig 3: The Effect of *Jatropha curcas* on RBC (10⁶) level of Chloroform intoxicated rats

(200mg/kg body weight of ethanol extract of *Jatropha curcas*) significantly increased ($p < 0.05$) in hemoglobin concentration when compared with groups 2 and 4 (positive control) rats showing the ameliorative properties of the extract. This agrees with the work of [2], that treated diabetic rats with extract of *Jatropha curcas* and recorded an elevation on the hemoglobin concentration. Figure 2 revealed that group 3 rats (treated with 200mg/kg body weight) significantly increased ($p < 0.05$) in packed cell volume when compared to group 1 (negative control) and group 5 (standard control) rats. Groups 2 and 4 rats treated with (100mg/kg body weight) and (0.5ml of

normal saline) decreased significantly ($p < 0.05$) in PCV concentration when compared with groups 1 (negative control) and 5 (standard control) rats revealing anemia due to chloroform induced oxidative stress. This also agrees with the work of [2].

Figure 3 showed no-significant ($p > 0.05$) difference in RBC concentration of groups 2 and 3 rats treated with graded doses of 100mg/kg and 200mg/kg body weights of ethanol extract of *Jatropha curcas* were compared with group 4 (positive control) rats showing that ethanol extract of *Jatropha curcas* had no effect on RBC concentration of the rats. Also group 5 (standard control)

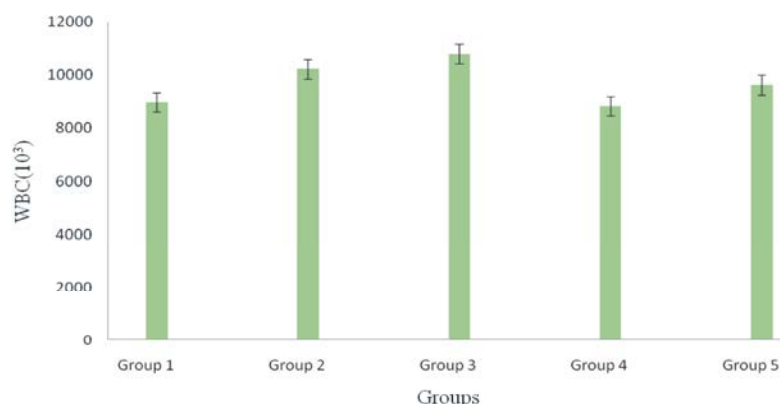


Fig 4: The Effect of *Jatropha curcas* on white blood cell (10^3) level of Chloroform intoxicated rats.

rats showed no-significant difference with group 1 (negative control) rats. This is in contrast with the work of [2] that observed an elevation of RBC concentration of rats on administration of *Jatropha curcas*. Figure 4 showed that groups 2 and 3 rats treated with graded doses of *Jatropha curcas* significantly increased ($p < 0.05$) in WBC concentration when compared with group 1 (negative control) rats and other groups. This shows that graded doses of ethanol extract of *Jatropha curcas* improved and elevated the concentration of WBC. Hence, group 5 (standard control) rats non-significantly increased ($p > 0.05$) in WBC concentration when compared with groups 1 (negative control) and 4 (positive control) rats. Nutritional status of an individual is dependent on dietary intake and effectiveness of metabolic processes. Packed cell volume is the volume by percentage of red cells in whole blood. The major function of the red blood cells is to transport hemoglobin, which in turn carries oxygen from the lungs to the tissues. The increase in total white blood cell count, hemoglobin concentration and packed cell volume indicates that, the extract was able to overcome the chloroform intoxication.

CONCLUSION

In conclusion, the results of the above study revealed that ethanol extract of *Jatropha curcas* could be used in the treatment and management of anemia.

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